



## Original article

## Barriers and facilitators to implementing trauma registries in low- and middle-income countries: Qualitative experiences from Tanzania



Hendry R. Sawe<sup>a,b,\*</sup>, Nathanael Sirili<sup>c</sup>, Ellen Weber<sup>d</sup>, Timothy J. Coats<sup>e</sup>, Lee A. Wallis<sup>b</sup>, Teri A. Reynolds<sup>b,f</sup>

<sup>a</sup> Department of Emergency Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

<sup>b</sup> Division of Emergency Medicine, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

<sup>c</sup> Department of Development Studies, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

<sup>d</sup> Emergency Department, University of California, San Francisco, CA, USA

<sup>e</sup> Department of Cardiovascular Sciences, University of Leicester, United Kingdom

<sup>f</sup> Clinical Services and Systems, Integrated Health Services, World Health Organization (WHO), Geneva, Switzerland

## ARTICLE INFO

## Keywords:

Trauma registry  
Tanzania  
Barriers and facilitators  
Trauma  
Low- and middle-income countries

## ABSTRACT

**Background:** The burden of trauma in low and middle-income countries (LMICs) is disproportionately high: LMICs account for nearly 90% of the global trauma deaths. Lack of trauma data has been identified as one of the major challenges in addressing the quality of trauma care and informing injury-preventing strategies in LMICs. This study aimed to explore the barriers and facilitators of current trauma documentation practices towards the development of a national trauma registry (TR).

**Methods:** An exploratory qualitative study was conducted at five regional hospitals between August 2018 and December 2018. Five focus group discussions (FGDs) were conducted with 49 participants from five regional hospitals. Participants included specialists, medical doctors, assistant medical officers, clinical officers, nurses, health clerks and information communication and technology officers. Participants came from the emergency units, surgical and orthopaedic inpatient units, and they had permanent placement to work in these units as non-rotating staff. We analysed the gathered information using a hybrid thematic analysis.

**Results:** Inconsistent documentation and archiving system, the disparity in knowledge and experience of trauma documentation, attitudes towards documentation and limitations of human and infrastructural resources in facilities we found as major barriers to the implementation of trauma registry. Health facilities commitment to standardising care, Ministry of Health and medicolegal data reporting requirements, and insurance reimbursements criteria of documentation were found as major facilitators to implementing trauma registry.

**Conclusions:** Implementation of a trauma registry in regional hospitals is impacted by multiple barriers related to providers, the volume of documentation, resource availability for care, and facility care flow processes. However, financial, legal and administrative data reporting requirements exist as important facilitators in implementing the trauma registry at these hospitals. Capitalizing in the identified facilitators and investing to address the revealed barriers through contextualized interventions in Tanzania and other LMICs is recommended by this study.

## African relevance

- Trauma constitutes significant morbidity and mortality in Africa.
- Trauma registries are non-existent in most African countries.
- Lack of trauma registries is a major challenge in understanding care and preventive strategies to reduce the burden in Africa.
- There is a need to understand different factors whose interplay affects the implementation of trauma registries in Africa.

## Background

The burden of trauma in low- and middle-income countries (LMICs) is disproportionately high, accounting for nearly 90% of all trauma-related deaths worldwide [1]. The World Health Organization (WHO) predicts that trauma will become the fifth leading cause of death in all groups by 2030 [2]. Lack of trauma data has been identified as one of the major challenges in addressing the quality of trauma care and

\* Corresponding author.

E-mail address: [hsawe@muhas.ac.tz](mailto:hsawe@muhas.ac.tz) (H.R. Sawe).

<https://doi.org/10.1016/j.afjem.2020.06.003>

Received 14 February 2020; Received in revised form 7 June 2020; Accepted 8 June 2020

Available online 11 July 2020

2211-419X/ © 2020 African Federation for Emergency Medicine. Publishing services provided by Elsevier. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

informing injury-preventing strategies in LMICs [3–6]: without data, strategies to improve the situation cannot be informed. It is estimated that nearly two million deaths - one-third of all trauma fatalities - could be prevented in LMICs if case fatality rates among seriously injured persons were reduced to levels seen in high-income countries [6]. In Africa, injury is among the top ten causes of mortality, claiming more lives than cancer, malaria, and HIV/AIDS combined [7,8]. While the burden of injury in Africa is very high, it remains understudied [9].

Tanzania, like most LMICs, has no formal trauma care system, and no formal trauma registry. The Ministry of Health has a purpose-designed handwritten Health Management Information System (HMIS) register that is used to record patient-level information at various levels of the healthcare system and share aggregate data for national-level compilations [10]. The HMIS register is designed to capture patient demographics, along with diagnoses, investigations, and dispositions.

Knowledge of the location and mechanism of injuries, along with subsequent patient outcomes, is key to developing a robust trauma care system, as these insights can focus efforts on parts of the system in greatest need of improvement. Trauma registries (TRs) - uniform sets of data on injured patients, containing demographics, injury details, information on prehospital and in-hospital care, diagnoses and outcomes - can help achieve this aim [11]. Prior efforts to establish and sustain TRs in Tanzania have been limited by many factors, including lack of resources and researcher time, and minimal buy-in from local institutions and stakeholders [12,13]. The current Road Accident Information System (RAIS) initiated by the Ministry of Works, Transport and Communications provides some data related to road traffic injuries [14]. RAIS is limited in many ways: it only conducts surveillance for road traffic injuries, and only injuries captured by the police system are reported, and it lacks outcomes data for patients taken to healthcare facilities. Due to these challenges, trauma data used for epidemiological studies, quality improvement (QI), and intervention planning are mostly reliant on single-site, hospital-based chart reviews or mortuary-based data logs [15–18].

Data on injury diagnoses, relevant interventions, and patient outcomes inform QI strategies and thus have become an essential component of all developed trauma systems [19–22]. However, in LMICs, lack of information gathering and sharing mechanisms, and limited documentation to define disease burdens and support monitoring activities, have been identified as major barriers to global emergency care development [22–24]; Tanzania is no exception.

In effort to address this gap, we are working to build a model for development of a national TR that is sustainable and scalable in Tanzania, and generalisable to other LMICs. This study aims to explore the barriers and facilitators of current trauma documentation practices, and factors that may affect implementation of a standardised trauma form at regional hospitals in Tanzania that will capture data essential to a TR.

## Methods

This was an explorative qualitative research study that used focus group discussions (FGDs) to gather information.

### Study setting

This study was carried out in five of the 31 regional hospitals in the United Republic of Tanzania - Morogoro, Arusha, Mwananyamala, Coastal and Tanga Regional Hospitals - between August and December 2018. Tanzania is a country with a population of 55 million people, located in Eastern Africa, and designated as a low-income country [25]. The average life expectancy is 65 years [25].

Tanzania's operates a decentralized health-care sector that is organized in a pyramid, with three levels of health-care services provision: primary, secondary and tertiary facilities [26]. Each higher-level facility acts as a referral site for its immediate lower level. The five

**Table 1**  
Hospital roles of focus group discussion participants.

Cadres	Participants N = 49 n (%)	Gender: male: %	Experience > 5 years: %
Nurse	13 (26.5)	23.1	69.2
Medical officer	11(22.4)	81.8	27.3
Assistant medical officer	8 (16.3)	87.5	87.5
Clinical officer	7 (14.3)	85.7	85.7
Specialist doctor			
Emergency physician	1 (2.0)	100	0
Orthopaedic/trauma specialist	2 (4.1)	100	50.0
Surgery specialist	2 (4.1)	100	50.0
Administrator	2 (4.1)	50	100
HMIS officer	2 (4.1)	50	100
ICT officer	1 (2.0)	100	100

regional hospitals represent 16% of regional hospitals and were purposefully selected based on their representativeness of regional hospital emergency care provision in the country, with varying stages of progress to implementation of formal emergency and trauma care centres. In all five regional hospitals, there was no standardised trauma documentation form, and each hospital had its modality of documenting for injured patients.

### Selection of participants

We employed a purposeful sampling strategy to select participants among staff with permanent placement in the emergency units, surgical and orthopaedic inpatient units within each selected hospital. The selection of these staff was based on their involvement in the care of trauma patients and documentation of relevant data. We, therefore, targeted the specialists, medical doctors, assistant medical officers, clinical officers, nurses, health clerks and Information and Communication Technology Officers. We targeted to have a focused group discussion of 6–10 participants from each hospital. We conducted one FGD in each hospital and the total number of participants after data collection was 49 nine participants (Table 1).

### Data collection and processing

FGDs were conducted in Kiswahili, moderated by the principal investigator using a semi-structured FDG guide. The FDG guide included questions, which sought to explore the barriers and facilitators to capturing trauma-related variables at respective hospitals. Multiple aspects of trauma care and documentation processes were inquired about, including capacity and capabilities for care, the capture rate of variables, and reasons for disparities in the documentation.

FGDs were held privately in a hospital conference room away from the site of patient care. Each FGD lasted approximately 60 min. The FGDs were audio-recorded using a digital recorder by the research assistant who accompanied the principal investigator. Each FGD continued until saturation was reached (when no new information was coming up despite different styles of probing).

### Data analysis

The audio recorded FGDs were transcribed verbatim, translated into English, and then imported into ATLAS.ti (Version 1.0.4, © ATLAS.ti, Berlin, Germany) qualitative data management and analysis software.

We used a hybrid thematic data analysis approach; this approach used both inductive and deductive reasoning [27]. We developed an initial codebook for data analysis, based on our study objectives. We then refined the codebook from the themes, which emerged during the analysis. The first author developed the initial codebook and shared it

with all authors. The codebook was discussed, further developed, and a final codebook was imported into ATLAS.ti qualitative data analysis computer software. The agreed codebook was tested by coding the first two interview transcripts by three authors independently. Their coding was almost similar and, hence, the codebook was not modified at the time.

At this stage, although the data analysis was guided, it was not confined to the primary codes. Inductive coding was assigned to text segments which represented a new theme that was not pre-determined. The new codes were assigned as separate codes or an expansion of the codes available in the initial codebook. Themes and emerging sub-themes were identified using Braun and Clarke's approach of thematic analysis [28]. The whole process of analysis was iterative, further scrutiny was carried out by going back to the interview transcripts to identify, summarize, and retain the patterns and similarities, differences, and newly emerged themes. Finally, we further clustered the sub-themes and the themes into two major categories of barriers and facilitators of implementing the trauma registry.

*Ethics approval and consent to participate*

Ethical approval was received by the University of Cape Town Human Research Ethics Committee and Muhimbili University of Health and Allied Sciences Institutional Review Board. All participants provided both written and verbal informed consent prior to participation.

**Results**

From the five FGDs with 49 participants we have categorized the themes into broad group of themes; facilitators towards the implementation of trauma registry and barriers to the implementation of trauma registry (Table 2).

*Facilitators towards the implementation of trauma registry*

From the analysis of the FGD transcripts we unveiled four themes which we have grouped them as facilitators towards the implementation of TR. These are facility commitment to standardising care, data reporting requirement by the Ministry of Health, insurance claims tied to documentation and medicolegal reporting requirements (Table 2).

*Theme one: facility commitment to standardising care*

In all facilities, providers expressed strong urge to improve quality of care to conform to standards. They stated that it is through a proper documentation process standard care will be realised. They further added that, to ensure provision of standardised care, there is a need of having a standard patient care documentation chart that will align all the providers towards one uniform format of recording data across all the departments and facilities.

*“...I believe this will really guide our care because, if you have many patients and working a very long shift and you have many patients, it's easy to forget important components of the care...”*

Coastal participant no. 2

**Table 2**  
Summary of findings.

No.	Broad group	Themes
1	Facilitators towards the implementation of trauma registry	<ul style="list-style-type: none"> <li>■ Facility commitment to standardising care</li> <li>■ Data reporting requirement by the Ministry of Health</li> <li>■ Insurance claims tied to documentation</li> <li>■ Medicolegal reporting requirements</li> </ul>
2	Barriers to the implementation of trauma registry	<ul style="list-style-type: none"> <li>■ Inconsistent documentation and archiving systems</li> <li>■ Inadequacy of human and infrastructural resources in health facilities</li> <li>■ Disparity in knowledge of and experiences with trauma care documentation</li> <li>■ Attitudes surrounding documentation</li> </ul>

Respondents felt that having a standard form will help to reduce proportion of missing variables and improve the care process for junior doctors by providing them with guidance and prompt on necessary interventions that are crucial to care of trauma patients.

*“... this will be the best, even when interns come and go, then they will all follow the same format, you know at times you train an intern how to document well, and after they have gained very well, then their rotation ends and they move on. This brings a new intern and then it becomes like a cycle so the documentation doesn't really improve because of this...”*

Morogoro participant no. 1

*Theme two: data reporting requirement by the Ministry of Health*

Most respondents expressed strong aspirations to meet the expectation of reporting correct data to the Ministry of Health (MoH). Participants felt that sharing the correct data will reflect local workloads and burdens of disease, so as to support facilities' needs for appropriate allocation of human and infrastructure resources.

*“.....there is a challenge as this data is sometimes not consistent you know what I mean...this really worries me sometimes that we are underreporting the volume of patients...the Ministry may see that we have very few patients...”*

Mwananyamala participant no. 1

*Theme three: insurance claims tied to documentation*

The discussants cited poor documentation as the main cause of insurance claims rejection from the National Health Insurance Fund (NHIF) and other insurers. This is problematic because these income sources are crucial to financially sustain facilities. Insurance reimbursement requires proper documentation of every component of care for the claim to be considered valid. The potential for additional revenue will likely incentivise providers to better document their care.

*“... without the proper billing, we are losing money because the insurance [NHIF] company rejects as high as 25% of our billings, and this is just because of poor billing. So you find that you have done so much to the patient and, since you are lazy to document, then we all lose so much money....”*

Tanga participant no. 5

*Theme four: medicolegal reporting requirements*

During the discussion, it was narrated that patients who are involved in motor vehicle accidents or have sustained intentional injuries or injuries with legal implication are supposed to have a special police form filled by the treating provider. This form details the incident resulting to injury and gravity of injury so as to inform legal proceedings when necessary. Better documentation and archiving will allow for these forms to be more easily completed, and for data to be retrieved should legal action be taken.

*“.....the police cases have to be properly documented you know some become court cases, so we are sometimes challenged to have the*

*documentation and when we fail it becomes a major issue....”*

Mwananyamala participant no. 6

The discussants further indicated the challenge on filling of the requisite police form:

*“...you see we have people and police sometimes visit us to fill the forms, the PF3 this makes its very tricky when we have no records....”*

Arusha participant no. 5

#### *Barriers to the implementation of trauma registry*

This analysis unveiled four themes which we grouped under barriers to the implementation of TR. These are inconsistent documentation and archiving systems, inadequacy of human and infrastructural resources in health facilities, disparity in knowledge of and experiences with trauma care documentation and attitudes surrounding documentation (Table 2).

#### *Theme one: inconsistent documentation and archiving systems*

The discussants cited limitations in the hospital archiving system as a significant hindrance to developing of TR. This limitation was noted to particularly problematic for patients discharged directly from EUs.

*“...you know, if a patient is discharged from the casualty, we normally do not file any card. We usually discharge the patients, as you know random papers in EU is regarded as poor quality in our SS arrangements....”*

Mwananyamala participant no. 3

In one hospital, discharged patients typically kept their own files in the form of personal booklets; these booklets are brought by patients, used for the duration of illness to document care, and then taken with the patient upon discharge.

*“...the filing system for documentation is not consistent. Most patients have personal booklets [used as files]; hence, if someone is sent for investigation and comes back with results, clinicians might write the medication on the results paper due to lack of continuation form.”*

Morogoro participant no. 8

#### *Theme two: inadequacy of human and infrastructural resources in health facilities*

The participants stated that inadequate human and infrastructural resources in health facilities may further limit the development and implementation of a TR. They cited challenges associated with inadequate EU staffing as one of the major reasons for poor documentation: the few available staff must prioritise care provision at the expense of proper documentation.

*“...you know our casualty (EU) is very understaffed and you will find you have one doctor at night and ten patients shows up at once, which makes it very hard for the doctor to document everything on a system that is also not user friendly....”*

Arusha participant no. 1

The majority of respondents further reflected that the documentation burden shouldered by EU providers have created a fatigue that limits the breadth and accuracy of documentation for details of clinical care provided to trauma patients.

*“.... In emergency unit we HMIS books and we have to fill it, and then we clerk on patient's booklets and have to fill some investigation forms then separately have to write prescription... so my concern is too much paperwork causes us to skip important parts.”*

Coastal participant no. 3

#### *Theme three: disparity in knowledge of and experiences with trauma care documentation*

The majority of respondents noted the variability in level of training and experience among clinicians as a significant reason for poor and inconsistent documentation. As illustrated in Table 1, the majority of clinicians were interns rotating in the EU for a variable period, typically about one month, and they become primary providers of care in this duration.

*“...most of the time, we have a medical doctor but also we do have interns who document for the patients, so there is, of course, a difference in the content of the documentation....”*

Tanga participant no. 9

Some respondents cited that level of training and experience have strong influences on how documentation is done for all trauma patients.

*“...you see, it also depends on who is seeing the patient. Sometimes, a senior doctor will see patient and do all important care, but will document only important elements.”*

Coastal participant no. 4

#### *Theme four: attitudes surrounding documentation*

Participants reported that individual attitudes of some clinicians towards documentation affected the amount and quality of documentation reported. Some respondents recognised negative attitude towards documentation among clinician as a challenge that will require concerted effort to change.

*“...there are individual behaviours...and this has also been discussed in the department level meetings... you find someone is only focused on the continuation form and ignores HMIS and other important books.”*

Morogoro participant no. 4

*“...also, people here have to change to know that documentation is important even in medical cases, as you know patients who complain will have to go back to the system for which documentation has to be proper....”*

Arusha participant no. 4

## **Discussion**

To the best of our knowledge, this is the first study that explored the barriers and facilitators to implementing a TR in low-income country. Our findings provide insight into factors whose interplay may lead to improved documentation processes and facilitate the development of a TR. Three of our findings on barriers to implementation of a TR among providers resonate with findings previously reported on poor quality of data generated from the HMIS in Tanzania: low awareness and knowledge of importance of trauma data and HMIS, high volume of patients, and significant shortage of human resources [26,29–31].

Shortages in providers and equipment were described by participants at all hospitals. The shortage of equipment might lead to decreased care and documentation. Previous studies focusing on execution and documentation of care under limited resources demonstrated that poor documentation is a result of both of lack of enough equipment, and frustration of staff towards inability to deliver care of conditions within their capacity [32,33].

Additional aspects not previously described in the literature were also identified, including factors affecting data documentation and storage, and provider attitudes towards documentation. Documentation of data was limited by numerous factors. Handling of individual files by patients was a reason for the lack of data in patients who have been discharged after receiving care. Most participants clearly highlighted the lack of archiving of data from patients as one of the main reasons for low or no documentation of injury variables. The lack of variables from these patients was further compounded by frequent reported loss of the



clinical files handled by the patients, which necessitated the need for acquiring new files and hence the loss of prior patient records.

Multiple documentation and reporting pathways were reported to impact the quality of documentation as providers indicated that they traded care provision for documentation. We noted duplication of reporting systems for the same data, which creates redundancy and adds more work to few available providers in the EU. In order to ensure success of gathering high quality clinical data, any reporting needs to avoid duplicating work of providers as this has already been reported to be counterproductive [34,35].

The hindrance of medical-legal data collection requirements to inform justice processes is a well-documented phenomenon [36]. In our findings, providers indicated a struggle to meet this requirement for some of the trauma patients due to lack of data records for patients, especially for those patients who have sustained injuries in a motor traffic crash. The need for such information on most trauma patients may facilitate the implementation of standardised documentation system, which can be archived to generate information when needed by the legal system.

The influence of providers' behaviour and attitudes towards quality of care have been reported in other medical contexts [37,38]; this impact is quite evident in the findings of this study. Provider fatigue has been previously identified as a major factor for medical errors and poor quality of care, that may have an impact on patient outcome and satisfaction [39,40]. Providers in this study reported how fatigue impacts documentation, directly affecting development and implementation of a TR. Training levels and experience of providers are known to impact care of injured patients [41,42]; existing literature aligns with that we found - that providers perceived junior doctors as being unreliable to perform proper documentation linked to the care provided. Some participants highlighted that the provision of care was not matching documentation; consequently, the patient would receive more care and less documentation, especially if the attending provider is senior. However, this phenomenon was unclear in junior clinicians, as absence of documentation might also have indicated lack of proper care.

Benefits of trauma data collection were also identified by participants, suggesting that these participants are ready and motivated to improve the situation. These facilitators are promising for the successful implementation and sustainment of a TR in Tanzania.

One facilitator of implementation found in this study was the incentive of having good documentation to increase the insurance reimbursement claims. Providers highlighted that facilities and individuals have been losing out to insurance claims despite provision of care, as a result of incomplete documentation to support claims. Providers indicated enthusiasm to ensure all clinical care provided to insurance beneficiaries is reimbursed, for the benefit of the facility and individual providers.

The requirement to submit data to inform decision-making process at the MoH was also facilitator to collecting adequate trauma data in EUs. Previous studies of HMIS have demonstrated inaccuracies and unreliability in data collected [43], aligning with reports from providers in this study. Interestingly, most providers felt frustrated by the potential inaccuracy of data in their facilities, as they felt this impacts them in two ways: firstly, their ability to secure additional staff and resources is compromised because of lack of supporting data, and, secondly, their status as a regional care facility is undermined by the low volume of data reported to the MoH. Most facilities demonstrated clear commitment towards implementing a system that could positively impact the reporting of injury data to the MoH. Towards this effort, there have been consistent suggestions to generate a standard template documenting care process, utilised by all staff, to ensure consistency in the reporting structures.

We adopted Guba's four criteria of credibility, dependability, transferability, and conformability to enhance the trustworthiness of our study findings [44]. In qualitative studies, the findings are trustworthy if they are worth believing [45]. The credibility of the findings

of this study was enhanced through the triangulation of study participants from the different units, which bring rich experiences from each hospital setting. To enhance the credibility and dependability of this study, triangulation of study settings and researchers were used. Conformability of the findings was enhanced through members debriefing after each FGD to confirm if what was captured by the researcher was what they said and clarity was added in areas needed. Furthermore, to ensure that the findings reflected participants' perspectives rather than the researchers' understanding of the question under study, themes were inductively generated and presented with the support of succinct quotes. The transferability of the findings of this study is enhanced through the description of the study setting, context, data collection process, and analysis.

The fact that a health worker (Emergency Medicine Physician) was involved in conducting the interviews, might have introduced social desirability from the participants. However, the triangulation of participants, setting and having research assistants with a social sciences background offset this limitation. Finally, the findings of this study reflect the situation during the period in which data collection for this study was carried out.

## Conclusion

Implementation of a TR in regional hospital is impacted by multiple barriers related to providers, volume of documentation, resource availability for care, and facility care flow processes. However, several facilitators to this implementation process are present, including monetary and resource incentives that are likely to result from taking advantage of financial, legal and administrative data reporting requirements. Capitalizing in the identified facilitators and investing to address the revealed barriers through contextualized interventions in Tanzania and other LMICs is recommended by this study.

## Dissemination of results

The results of this study were shared with all the health facilities involved through the respective heads of the emergency units, in the form of the first draft of this manuscript.

## Authors' contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: HRS contributed 50%; NS 20%, EB 5%, TJC 5%, and LAW and TAR contributed 10% each. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

## Declaration of competing interest

The authors declared no conflicts of interest.

## Acknowledgements

The authors thank Ministry of Health, Community Development, Gender, Elderly and Children, and management and staff at participating hospitals. We extend special thanks to the Heads of participating EUs: Dr. Nanyori Lukumay (Arusha), Dr. Nafsa Marombwa (Morogoro), Dr. Raymond Makona (Mwananyamala), Dr. Siaely Moshi (Coastal), and Dr. Aris Banda (Tanga).

## References

- [1] Haagsma JA, Graetz N, Bolliger I, Naghavi M, Higashi H, Mullany EC, et al. The global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. *Inj. Prev.* 2016;22(1):3–18.

- <https://doi.org/10.1136/injuryprev-2015-041616>.
2. Injuries and violence: the facts. Geneva, Switzerland: World Health Organization; 2010.
  - [3] Mock C, Essential Trauma Care Project (World Health Organization)World Health Organization/International Society of Surgery/International Association for the Surgery of Trauma and Surgical Intensive Care editors. Guidelines for essential trauma care. Geneva: World Health Organization; 2004. [93 p].
  - [4] Hashmi ZG, Haider AH, Zafar SN, Kisan M, Moosa A, Siddiqui F, et al. Hospital-based trauma quality improvement initiatives: first step toward improving trauma outcomes in the developing world. *J Trauma Acute Care Surg* 2013;75(1):60–8. Jul.
  - [5] Hofman K, Primack A, Keusch G, Hrynokow S. Addressing the growing burden of trauma and injury in low- and middle-income countries. *Am J Public Health* 2005;95(1):13–7. Jan.
  - [6] Mock C, Joshipura M, Arreola-Risa C, Quansah R. An estimate of the number of lives that could be saved through improvements in trauma care globally. *World J Surg* 2012;36(5):959–63. May.
  - [7] World Health Organization. The global burden of disease: 2004 update. World Health Organization; 2008. [156 p].
  8. WHO/Disease and injury country estimates [internet]. WHO. [cited 2015 Nov 1]. Available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_country/en/](http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/).
  - [9] Reynolds TA, Stewart B, Drewett I, Salerno S, Sawe HR, Toroyan T, et al. The impact of trauma care systems in low- and middle-income countries. *Annu Rev Public Health* 2017;38:507–32. Mar 20.
  10. Ministry of Health. Tanzania HMIS [internet]. Tanzania Health Management Information System; 2017 Available from [www.dhis.moh.go.tz](http://www.dhis.moh.go.tz).
  - [11] Zehetabchi S, Nishijima DK, McKay MP, Clay Mann N. Trauma registries: history, logistics, limitations, and contributions to emergency medicine research. *Academic Emergency Medicine* [Internet] 2011 Jun 1;18(6):637–43. cited 2017 Jun 26. Available from <http://online.library.wiley.com/doi/10.1111/j.1553-2712.2011.01083.x/abstract>.
  - [12] Chokotho LC, Mulwafu W, Nyirenda M, Mbomuwa FJ, Pandit HG, Le G, et al. Establishment of trauma registry at Queen Elizabeth Central Hospital (QECH), Blantyre, Malawi and mapping of high risk geographic areas for trauma. *World J Emerg Med* 2019;10(1):33–41. Internet. cited 2019 May 24. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6264976/>.
  - [13] Mehmood A, Razzak JA. Trauma registry—needs and challenges in developing countries. *J Pak Med Assoc* 2009 Dec;59(12):807–8.
  - [14] Tanzania Ministry of Works, Transport and Communications. Road accident information system [internet]. RAIS; 2013 [cited 2019 Dec 7]. Available from: <https://rais.mow.go.tz>.
  - [15] Chalya PL, Gilyoma JM, Dass RM, Mchembe MD, Matasha M, Mabula JB, et al. Trauma admissions to the intensive care unit at a reference hospital in Northwestern Tanzania. *Scand J Trauma Resusc Emerg Med* 2011;19:61.
  - [16] Champion HR, Copes WS, Sacco WJ, Lawnick MM, Keast SL, Bain LW, et al. The Major Trauma Outcome Study: establishing national norms for trauma care. *J Trauma* 1990;30(11):1356–65. Nov.
  - [17] Gabbe BJ, Lyons RA, Fitzgerald MC, Judson R, Richardson J, Cameron PA. Reduced population burden of road transport-related major trauma after introduction of an inclusive trauma system. *Ann Surg* 2015;261(3):565–72. Mar.
  - [18] Kobusingye OC, Lett RR. Hospital-based trauma registries in Uganda. *J Trauma* 2000;48(3):498–502. Mar.
  - [19] Nwomeh BC, Lowell W, Kable R, Haley K, Ameh EA. History and development of trauma registry: lessons from developed to developing countries. *World J Emerg Surg* 2006;1:32.
  20. WHO. Guidelines for trauma quality improvement programmes Internet WHO; 2009 [cited 2015 Oct 6]. Available from: [http://www.who.int/violence\\_injury\\_prevention/services/traumacare/traumaguidelines/en/](http://www.who.int/violence_injury_prevention/services/traumacare/traumaguidelines/en/).
  - [21] Moore L, Clark DE. The value of trauma registries. *Injury* 2008;39(6):686–95. Jun.
  - [22] O'Reilly GM, Joshipura M, Cameron PA, Gruen R. Trauma registries in developing countries: a review of the published experience. *Injury* 2013;44(6):713–21. Jun.
  - [23] O'Reilly GM, Cameron PA, Joshipura M. Global trauma registry mapping: a scoping review. *Injury* 2012;43(7):1148–53. Jul.
  - [24] Reynolds TA, Bisanzo M, Dworkis D, Hansoti B, Obermeyer Z, Seidenberg P, et al. Research priorities for data collection and management within global acute and emergency care systems. *Acad Emerg Med* 2013;20(12):1246–50. Dec.
  25. World Bank. World bank data [internet]. World bank data; 2017 Available from <http://data.worldbank.org/country/tanzania>.
  - [26] Sirili N, Kiwara A, Gasto F, Goicolea I, Hurligt A-K. Training and deployment of medical doctors in Tanzania post-1990s health sector reforms: assessing the achievements. *Human Resources for Health* [Internet] 2017 Dec;15(1) cited 2019 Dec 12. Available from <http://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0202-7>.
  - [27] Fereday J, Muir-Cochrane E. Demonstrating rigor using thematic analysis: a hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods* [Internet] 2006 Mar;5(1):80–92. cited 2020 May 3. Available from <http://journals.sagepub.com/doi/10.1177/160940690600500107>.
  - [28] Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3(2):77–101. Internet. Jan [cited 2018 Jul 11]. Available from: <http://www.tandfonline.com/doi/abs/10.1191/1478088706qp0630a>.
  - [29] Baker T, Lugazia E, Eriksen J, Mwaifongo V, Irestedt L, Konrad D. Emergency and critical care services in Tanzania: a survey of ten hospitals. *BMC Health Serv Res* 2013;13(1):140. Internet. Apr 16 [cited 2018 Oct 7]. Available from: <https://doi.org/10.1186/1472-6963-13-140>.
  - [30] Koka PM, Sawe HR, Mbaya KR, Kilindimo SS, Mfinanga JA, Mwaifongo VG, et al. Disaster preparedness and response capacity of regional hospitals in Tanzania: a descriptive cross-sectional study. *BMC Health Serv Res* 2018 Nov 6;18(1):835. Internet. Available from <https://doi.org/10.1186/s12913-018-3609-5>.
  - [31] Manzi F, Schellenberg JA, Hutton G, Wyss K, Mbuya C, Shirima K, et al. Human resources for health care delivery in Tanzania: a multifaceted problem. *Hum Resour Health* 2012;10:3. Internet. Feb 22 [cited 2016 Nov 11]. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3311084/>.
  - [32] Moyimane MB, Matlala SF, Kekana MP. Experiences of nurses on the critical shortage of medical equipment at a rural district hospital in South Africa: a qualitative study. *Pan Afr Med J* 2017;28. Internet. Sep 29 [cited 2019 Dec 12]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5837176/>.
  - [33] Bradley S, Kamwendo F, Chipeta E, Chimwaza W, de Pinho H, McAuliffe E. Too few staff, too many patients: a qualitative study of the impact on obstetric care providers and on quality of care in Malawi. *BMC Pregnancy Childbirth* 2015:15. Internet. Mar 21 [cited 2019 Dec 12]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4377843/>.
  - [34] Patel RS, Bachu R, Adikey A, Malik M, Shah M. Factors related to physician burnout and its consequences: a review. *Behav Sci (Basel)* 2018;8(11) Internet. Oct 25 [cited 2019 Dec 12]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6262585/>.
  - [35] Gesner E, Gazarian P, Dykes P. The burden and burnout in documenting patient care: an integrative literature review. *Stud Health Technol Inform* 2019 Aug 21;264:1194–8.
  - [36] Mathioudakis A, Rousalova I, Gagnat AA, Saad N, Hardavella G. How to keep good clinical records. *Breathe (Sheff)* 2016 Dec;12(4):369–73. Internet. cited 2019 Dec 12. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5297955/>.
  - [37] Mannava P, Durrant K, Fisher J, Chersich M, Luchters S. Attitudes and behaviours of maternal health care providers in interactions with clients: a systematic review. *Globalization and Health* 2015;11(1) Internet. Dec [cited 2019 Dec 12]. Available from: <http://www.globalizationandhealth.com/content/11/1/36>.
  - [38] Mosadeghrad AM. Factors influencing healthcare service quality. *Int J Health Policy Manag* 2014;3(2):77–89. Internet. cited 2019 Dec 12. Available from [http://www.ijhpm.com/article\\_2864\\_607.html](http://www.ijhpm.com/article_2864_607.html).
  - [39] Bari A, Khan RA, Rathore AW. Medical errors; causes, consequences, emotional response and resulting behavioral change. *Pak J Med Sci* 2016;32(3):523–8. Internet. cited 2019 Dec 12. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4928391/>.
  - [40] Sheikhtaheri A, Sadeqi-Jabali M, Hashemi-Dehaghi Z. Physicians' perspectives on causes of health care errors and preventive strategies: a study in a developing country. *Iran J Public Health* 2018 May;47(5):720–8. Internet. cited 2019 Dec 12. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6005985/>.
  - [41] Bruce MM, Kassam-Adams N, Rogers M, Anderson KM, Sluys KP, Richmond TS. Trauma providers' knowledge, views and practice of trauma-informed care. *J Trauma Nurs* 2018;25(2):131–8. Internet. cited 2019 Dec 12. Available from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5968451/>.
  - [42] Tarighi P, Sherman JE, Mian O, Nathens AB. The importance of tailoring physicians' trauma care training needs in rural environments. *Can J Surg* 2015;58(6):423–5. Internet. Dec [cited 2019 Dec 12]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4651696/>.
  - [43] Wilms MC, Mbembela O, Prytherch H, Hellmold P, Kuelker R. An in-depth, exploratory assessment of the implementation of the National Health Information System at a district level hospital in Tanzania. *BMC Health Serv Res* 2014;14:91. Feb 26.
  - [44] Shenton AK. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information* 2004;22(2):63–75. Internet. Jul 19 [cited 2020 Mar 27]. Available from: <https://www.medra.org/servelet/aliasResolver?alias=iospres&doi=10.3233/EFI-2004-22201>.
  - [45] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004 Feb;24(2):105–12. Internet. cited 2020 Mar 27. Available from <https://linkinghub.elsevier.com/retrieve/pii/S0260691703001515>.